

We Claim:

1. A transfer case magnetic operator comprising:
a primary output shaft;
a drive sprocket rotatably disposed on said primary output shaft;
a permanent magnet actuator having a magnet array disposed for rotation about said primary output shaft and at least one induction ring disposed adjacent said magnet array and rotatable about said primary output shaft; and
a clutch operably disposed between said primary output shaft and said drive sprocket and adjacent said permanent magnet actuator and acted upon by said actuator.
2. The transfer case magnetic operator of claim 1 further including a secondary output shaft, a driven chain sprocket coupled to said secondary output shaft, and a drive chain engaging said chain sprockets.
3. The transfer case magnetic operator of claim 1 wherein said clutch is a friction clutch pack.
4. The transfer case magnetic operator of claim 3 further including a ball ramp operator.
5. The transfer case magnetic operator of claim 1 wherein said clutch is a dog clutch and said operator functions as a synchronizer.

6. The transfer case magnetic operator of claim 1 wherein said magnet array includes a plurality of magnets arranged end to end with alternating poles.

7. The transfer case magnetic operator of claim 1 further including a planetary gear speed reduction assembly for selectively driving said primary output shaft.

8. A magnetically actuated clutch comprising, in combination,
an input member,
an output member,
a first plate coupled to said input member for rotation therewith, said first plate including a first plurality of curved, ramped recesses,
a second plate disposed adjacent said first circular plate and having a second plurality of curved, ramped recesses facing said first plurality of curved, ramped recesses,
a plurality of load transferring members disposed in said opposed pluralities of recesses,
a friction clutch pack disposed adjacent said first plate containing a first plurality of clutch plates coupled to said input member for rotation therewith and a second plurality of clutch plates interleaved with said first plurality of clutch plates and operably coupled to said output member for rotation therewith,
at least one permanent magnet coupled to said second plate for rotation therewith and,

at least one induction member disposed adjacent said permanent magnet and coupled to said output member for rotation therewith.

9. The magnetically actuated clutch of claim 8 further including a transfer case having primary and secondary outputs and wherein said input member is coupled to said primary output and said output member is coupled to said secondary output.

10. The magnetically actuated clutch of claim 8 having a plurality of permanent magnets arranged end to end and coupled to said second plate.

11. The magnetically actuated clutch of claim 8 wherein said first plate is circular and splined to said input member.

12. The magnetically actuated clutch of claim 8 wherein said second plate is circular and is restrained on one side by a thrust bearing.

13. The magnetically actuated clutch of claim 8 further including an apply plate disposed between said first plate and said friction clutch pack.

14. The magnetically actuated clutch of claim 8 further including a spring stack disposed adjacent said first plate.

15. A synchronizer for facilitating engagement of rotatable members comprising, in combination,

a first rotatable member having engageable teeth disposed thereon,

a second rotatable member disposed adjacent said first rotatable member and having engageable teeth disposed thereon,

a clutch collar engaging said engageable teeth on said first member and disposed for axial motion and engagement with said engageable teeth on said second member,

a permanent magnet coupled to said second member and disposed for rotation therewith, and

an induction member disposed adjacent said permanent magnet and coupled to said clutch collar for rotation therewith.

16. The synchronizer for facilitating engagement of rotatable members of claim 15 further including a transfer case having primary and secondary outputs and wherein said first rotatable member is coupled to said primary output and said second rotatable member is coupled to said secondary output.

17. The synchronizer for facilitating engagement of rotatable members of claim 15 having a plurality of permanent magnets arranged end to end and coupled to said second rotatable member.

18. The synchronizer for facilitating engagement of rotatable members of claim 15 wherein said clutch collar is spring biased.

19. The synchronizer for facilitating engagement of rotatable members of claim 15 further including a spring biased shift collar and a bi-directionally translatable shift fork.

20. The synchronizer for facilitating engagement of rotatable members of claim 15 wherein said second rotatable member is splined to an output shaft.